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KACVINSKY LLC
C/O INTELLEVATE
P.O. BOX 52050
MINNEAPOLIS, MN 55402

EXAMINER
BURD, KEVIN MICHAEL

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 October 2009*.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,10-12,14-16 and 18* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,10-12,14-16 and 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

1.   This office action, in response to the amendment filed 10/2/2009, is a final office

action.

Response to Arguments

2.   The declaration filed on 6/24/2009 under 37 CFR 1.131 has been considered but

is ineffective to overcome the Sun et al (US 2005/0152314) reference. The declaration

is silent regarding where the prior invention was established. Prior invention may not be

established under this section in any country other than the United States, a NAFTA

country, or a WTO member country (MPEP 715). The residency and citizenship of the

inventors does not indicate where the invention was established. In addition, applicant's

representative states all the inventors live in and are citizens of the United States, a

NAFTA country or a WTO member country. However, Russia is not a WTO member

country.

3.   Applicant's arguments filed 10/2/2009 have been fully considered but they are

not persuasive. Applicant states Ebiko does not disclose the equalizer recited in the

claims and therefore, the prior art does not disclose all the limitations of the claimed

invention. The examiner disagrees. As stated previously, Ebiko discloses a received

sequence is input to a channel estimation section 120 (figure 1). The channel estimation

section receives a replica of the received signal from the equalizer 130 (abstract). The

replica of the received signal is de-interleaved 140 and decoded 150 to recover the

originally transmitted symbol. This symbol is fed to the channel estimation section 120

to determine the channel estimation. The channel estimation receives a received

symbol and the replica of the originally transmitted symbol. In the combination of Mody in view of Ebiko, the received signal is a transmitted multicarrier symbol for each of a plurality of subcarriers. Mody shows this is the transmitted signal. By applying the equalizer of Ebiko, it would have been obvious for one of ordinary skill in the art at the time of the invention to include an adaptive equalizer in the apparatus. Instead of using a fixed replica symbol and being required to transmit a known sequence to determine the channel estimate, data is used to calculate the estimate. Therefore, the data rate of the system is increased allowing more data to be transmitted in less time than before. In the combination of Sun and Andre in view of Ebiko, the received signal is a transmitted multicarrier symbol for each of a plurality of subcarriers. Sun shows this is the transmitted signal. By applying the equalizer of Ebiko, it would have been obvious for one of ordinary skill in the art at the time of the invention to include an adaptive equalizer in the apparatus. Instead of using a fixed replica symbol and being required to transmit a known sequence to determine the channel estimate, data is used to calculate the estimate. Therefore, the data rate of the system is increased allowing more data to be transmitted in less time than before.

For these reasons and the reasons stated in the previous office action, the rejections of the claims are maintained and stated below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 1-3 and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sun et al (US 2005/0152314) in view of Andre (WO 01/37474) further in view of Ebiko et al (WO 03/071712). Ebiko et al (US 2004/0161058) is a translation of Ebiko et al (WO 03/071712) and is referenced in the rejection stated below.

Regarding claim 1, Sun discloses an averaging circuit adapted to provide an averaged channel estimate by performing a time domain averaging and a frequency domain averaging on one or more received inputs (paragraph 0154). An equalizer equalizes a received multicarrier symbol based on the averaged channel estimate. The channel estimate H is used to calculate the equalization (paragraphs 0155-0160). Sun does not disclose a coarse channel estimator to receive a symbol replica and a received symbol to generate a coarse channel estimate. However, it is well known in the art of data communication that a received signal is equivalent to the transmitted signal and the distortion caused by the medium the transmitted signal travels through prior to being received. This fact is shown in figure 3a of Andre. The response H of a channel is equal to the received sequence divided by the known transmitted sequence in the frequency domain. This is further described in page 9, lines 11-21. The transfer function is the channel estimate. It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Andre into the apparatus of Sun to utilize the equation of $H(f) = R(f)/T(f)$ to determine a transfer function (channel estimate). The channel estimate is important to determine in a receiver since the distortion cause

by the channel will degrade the received signal and may prevent the proper recovery of the transmitted signal. The combination discloses a known sequence is used to determine the channel response. The known sequence will be stored in the receiver. The combination does not disclose the generation of a replica of the transmitted symbol. Ebiko discloses a received sequence is input to a channel estimation section 120 (figure 1). The channel estimation section receives a replica of the received signal from the equalizer 130 (abstract). The replica of the received signal is de-interleaved 140 and decoded 150 to recover the originally transmitted symbol. This symbol is fed to the channel estimation section 120 to determine the channel estimation. The channel estimation receives a received symbol and the replica of the originally transmitted symbol. It would have been obvious for one of ordinary skill in the art at the time of the invention to include an adaptive equalizer in the apparatus. Instead of using a fixed replica symbol and being required to transmit a known sequence to determine the channel estimate, data is used to calculate the estimate. Therefore, the data rate of the system is increased allowing more data to be transmitted in less time than before.

Regarding claim 2, Sun discloses the averaging circuit is adapted to provide an averaged channel estimate by performing time domain averaging and frequency domain averaging on one or more received channel estimates (paragraph 0154).

Regarding claim 3, Sun further discloses the averaging circuit comprises a time domain averaging block adapted to perform time domain averaging on a plurality of received channel estimates to generate a time domain averaged channel estimate on a per subcarrier basis (paragraphs 0154 and 0156). A frequency domain averaging block

is adapted to perform frequency domain averaging on a received time domain averaged

channel estimate (paragraph 0154). The time domain averaging is taken prior to the

FFT and the frequency domain averaging is done after the FFT.

Regarding claim 10, Sun discloses the multicarrier symbol comprises an OFDM

symbol (paragraph 0110).

Regarding claims 11 and 13, Sun discloses an averaging circuit adapted to

provide an averaged channel estimate by performing a time domain averaging and a

frequency domain averaging on one or more received inputs (paragraph 0154). An

equalizer equalizes a received multicarrier symbol based on the averaged channel

estimate. The channel estimate H is used to calculate the equalization (paragraphs

0155-0160). Sun discloses the equalizer comprises an adaptive equalizer (paragraph

0156). Sun does not disclose a coarse channel estimator to receive a symbol replica

and a received symbol to generate a coarse channel estimate. However, it is well

known in the art of data communication that a received signal is equivalent to the

transmitted signal and the distortion caused by the medium the transmitted signal

travels through prior to being received. This fact is shown in figure 3a of Andre. The

response H of a channel is equal to the received sequence divided by the known

transmitted sequence in the frequency domain. This is further described in page 9, lines

11-21. The transfer function is the channel estimate. It would have been obvious for one

of ordinary skill in the art at the time of the invention to combine the teachings of Andre

into the apparatus of Sun to utilize the equation of H(f) = R(f)/T(f) to determine a transfer

function (channel estimate). The channel estimate is important to determine in a

receiver since the distortion cause by the channel will degrade the received signal and
may prevent the proper recovery of the transmitted signal. Andre transmits a known
sequence to determine the effect of the channel on the received data. The channel can
be compensated for and data will be properly recovered. The combination does not
disclose the generation of a replica of the transmitted symbol. Ebiko discloses a
received sequence is input to a channel estimation section 120 (figure 1). The channel
estimation section receives a replica of the received signal from the equalizer 130
(abstract). The replica of the received signal is de-interleaved 140 and decoded 150 to
recover the originally transmitted symbol. This symbol is fed to the channel estimation
section 120 to determine the channel estimation. The channel estimation receives a
received symbol and the replica of the originally transmitted symbol. It would have been
obvious for one of ordinary skill in the art at the time of the invention to include an
adaptive equalizer in the apparatus. Instead of using a fixed replica symbol and being
required to transmit a known sequence to determine the channel estimate, data is used
to calculate the estimate. Therefore, the data rate of the system is increased allowing
more data to be transmitted in less time than before.

Regarding claim 12, Sun discloses the averaging circuit is adapted to provide an
averaged channel estimate by performing time domain averaging and frequency domain
averaging on one or more received channel estimates (paragraph 0154).

Regarding claim 14, Sun discloses the multicarrier symbol comprises an OFDM
symbol (paragraph 0110).

5.   Claims 4, 15, 16 and 18 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Sun et al (US 2005/0152314) in view of Andre (WO 01/37474) further

in view of Ebiko et al (WO 03/071712) further in view of Kim et al (US 2004/0125235).

Regarding claim 4, the combination of Sun, Andre and Ebiko discloses the

apparatus stated above in paragraph 5. The combination does not disclose the

frequency domain averaging block generates frequency domain averaged channel

estimates that are used to update coefficients of the equalizer. Kim discloses using

channel estimates to update coefficients of the equalizer (paragraph 0021) to reduce

channel distortion (paragraph 0021). For this reason, it would have been obvious for

one of ordinary skill in the art at the time of the invention to combine the coefficient

update of Kim into the apparatus of the combination of Sun, Andre and Ebiko.

Regarding claims 15 and 16, Sun discloses an averaging circuit adapted to

provide an averaged channel estimate by performing a time domain averaging and a

frequency domain averaging on one or more received inputs (paragraph 0154). An

equalizer equalizes a received multicarrier symbol based on the averaged channel

estimate. The channel estimate H is used to calculate the equalization (paragraphs

0155-0160). Sun does not disclose a coarse channel estimator to receive a symbol

replica and a received symbol to generate a coarse channel estimate. However, it is

well known in the art of data communication that a received signal is equivalent to the

transmitted signal and the distortion caused by the medium the transmitted signal

travels through prior to being received. This fact is shown in figure 3a of Andre. The

response H of a channel is equal to the received sequence divided by the known

transmitted sequence in the frequency domain. This is further described in page 9, lines

11-21. The transfer function is the channel estimate. It would have been obvious for one

of ordinary skill in the art at the time of the invention to combine the teachings of Andre

into the apparatus of Sun to utilize the equation of $H(f) = R(f)/T(f)$ to determine a transfer

function (channel estimate). The channel estimate is important to determine in a

receiver since the distortion cause by the channel will degrade the received signal and

may prevent the proper recovery of the transmitted signal. The combination discloses a

known sequence is used to determine the channel response. The known sequence will

be stored in the receiver. The combination does not disclose the generation of a replica

of the transmitted symbol. Ebiko discloses a received sequence is input to a channel

estimation section 120 (figure 1). The channel estimation section receives a replica of

the received signal from the equalizer 130 (abstract). The replica of the received signal

is de-interleaved 140 and decoded 150 to recover the originally transmitted symbol.

This symbol is fed to the channel estimation section 120 to determine the channel

estimation. The channel estimation received a received symbol and the replica of the

originally transmitted symbol. It would have been obvious for one of ordinary skill in the

art at the time of the invention to include an adaptive equalizer in the apparatus. Instead

of using a fixed replica symbol and being required to transmit a known sequence to

determine the channel estimate, data is used to calculate the estimate. Therefore, the

data rate of the system is increased allowing more data to be transmitted in less time

than before. The combination of Sun, Andre and Ebiko does not disclose the frequency

domain averaging block generates frequency domain averaged channel estimates that

are used to update coefficients of the equalizer. Kim discloses using channel estimates

to update coefficients of the equalizer (paragraph 0021) to reduce channel distortion

(paragraph 0021). For this reason, it would have been obvious for one of ordinary skill in

the art at the time of the invention to combine the coefficient update of Kim into the

apparatus of the combination of Sun, Andre and Ebiko.

Regarding claim 18, Sun discloses an averaging circuit adapted to provide an

averaged channel estimate by performing a time domain averaging and a frequency

domain averaging on one or more received inputs (paragraph 0154). An equalizer

equalizes a received multicarrier symbol based on the averaged channel estimate. The

channel estimate H is used to calculate the equalization (paragraphs 0155-0160). Sun

does not disclose a coarse channel estimator to receive a symbol replica and a received

symbol to generate a coarse channel estimate. However, it is well known in the art of

data communication that a received signal is equivalent to the transmitted signal and

the distortion caused by the medium the transmitted signal travels through prior to being

received. This fact is shown in figure 3a of Andre. The response H of a channel is equal

to the received sequence divided by the known transmitted sequence in the frequency

domain. This is further described in page 9, lines 11-21. The transfer function is the

channel estimate. It would have been obvious for one of ordinary skill in the art at the

time of the invention to combine the teachings of Andre into the apparatus of Sun to

utilize the equation of $H(f) = R(f)/T(f)$ to determine a transfer function (channel estimate).

The channel estimate is important to determine in a receiver since the distortion cause

by the channel will degrade the received signal and may prevent the proper recovery of

the transmitted signal. Andre transmits a known sequence to determine the effect of the

channel on the received data. The channel can be compensated for and data will be

properly recovered. The combination does not disclose the generation of a replica of the

transmitted symbol. Ebiko discloses a received sequence is input to a channel

estimation section 120 (figure 1). The channel estimation section receives a replica of

the received signal from the equalizer 130 (abstract). The replica of the received signal

is de-interleaved 140 and decoded 150 to recover the originally transmitted symbol.

This symbol is fed to the channel estimation section 120 to determine the channel

estimation. The channel estimation receives a received symbol and the replica of the

originally transmitted symbol. It would have been obvious for one of ordinary skill in the

art at the time of the invention to include an adaptive equalizer in the apparatus. Instead

of using a fixed replica symbol and being required to transmit a known sequence to

determine the channel estimate, data is used to calculate the estimate. Therefore, the

data rate of the system is increased allowing more data to be transmitted in less time

than before. The combination of Sun, Andre and Ebiko does not disclose the frequency

domain averaging block generates frequency domain averaged channel estimates that

are used to update coefficients of the equalizer. Kim discloses using channel estimates

to update coefficients of the equalizer (paragraph 0021) to reduce channel distortion

(paragraph 0021). For this reason, it would have been obvious for one of ordinary skill in

the art at the time of the invention to combine the coefficient update of Kim into the

apparatus of the combination of Sun, Andre and Ebiko.

6.   Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sun et al
(US 2005/0152314) in view of Andre (WO 01/37474) further in view of Ebiko et al (WO
03/071712) further in view of Papathanasion (US 2004/0142665).

        Regarding claim 5, the combination of Sun, Andre and Ebiko discloses the
apparatus stated above in paragraph 5. The combination does not disclose the time
domain averaging is performed using a moving average. Papathanasion discloses
averaging using a moving average in paragraph 0042. Moving averaging is well known
in the art for its ability to maintain a constant average value. For this reason, it would
have been obvious for one of ordinary skill in the art at the time of the invention to
combine the teaching of Papathanasion into the apparatus of the combination of Sun,
Andre and Ebiko.

7.   Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sun et al
(US 2005/0152314) in view of Andre (WO 01/37474) further in view of Ebiko et al (WO
03/071712) further in view of Abeta et al (US 6,757,272).

        Regarding claim 6, the combination of Sun, Andre and Ebiko discloses the
apparatus stated above in paragraph 5. The combination does not disclose the time
domain averaging is done by block averaging. Abeta discloses using block averaging
(column 7, lines 57-67) since block averaging is computationally efficient since the
average is not being constantly calculated. For this reason, it would have been obvious
for one of ordinary skill in the art at the time of the invention to combine the block
averaging of Abeta into the combination of Sun, Andre and Ebiko.

8.   Claims 1-4, 10-16 and 18 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Mody et al (US 2002/0181390) in view of Ebiko et al (WO

03/071712). Ebiko et al (US 2004/0161058) is a translation of Ebiko et al (WO

03/071712) and is referenced in the rejection stated below.

        Regarding claim 1, Mody discloses an averaging circuit adapted to provide an

averaged channel estimate by performing a time domain averaging and a frequency

domain averaging on one or more received inputs (claim 29). The aim of the channel

estimation algorithm is to estimate the channel coefficients for all the sub-carriers

(paragraph 0085). The averaging of the coarse channel estimates in the frequency

domain and the time domain takes place in the parameter estimator 112 of figure 8. The

parameter estimator 112 provides an input signal to channel decoder 118 that detects

and corrects errors in the data symbols (paragraph 0076). The channel decoder 118

outputs the data in its original form (paragraph 0076). The channel decoder is the

adaptive equalizer and will provided feedback signals to the parameter estimator to

adjust and correct its estimates according to the output of the channel decoder

(paragraph 0076). The channel estimate is equal to the transfer function. The received

signal is equivalent to the transmitted signal and the distortion caused by the medium

the transmitted signal travels through prior to being received. The response H of a

channel is equal to the received sequence divided by the known transmitted sequence

in the frequency domain. The adjustments to the estimates will be conducted according

to the equation of $H(f) = R(f)/T(f)$ to determine a transfer function (channel estimate).

The combination discloses a known sequence is used to determine the channel

response. The known sequence will be stored in the receiver. This is described as a

training sequence in paragraph 0076. The combination does not disclose the generation

of a replica of the transmitted symbol. Ebiko discloses a received sequence is input to a

channel estimation section 120 (figure 1). The channel estimation section receives a

replica of the received signal from the equalizer 130 (abstract). The replica of the

received signal is de-interleaved 140 and decoded 150 to recover the originally

transmitted symbol. This symbol is fed to the channel estimation section 120 to

determine the channel estimation. The channel estimation receives a received symbol

and the replica of the originally transmitted symbol. It would have been obvious for one

of ordinary skill in the art at the time of the invention to include an adaptive equalizer in

the apparatus. Instead of using a fixed replica symbol and being required to transmit a

known sequence to determine the channel estimate, data is used to calculate the

estimate. Therefore, the data rate of the system is increased allowing more data to be

transmitted in less time than before.

Regarding claim 2, Mody discloses the averaging circuit is adapted to provide an

averaged channel estimate by performing time domain averaging and frequency domain

averaging on one or more received channel estimates (claim 29).

Regarding claim 3, Mody further discloses the averaging circuit comprises a time

domain averaging block adapted to perform time domain averaging on a plurality of

received channel estimates to generate a time domain averaged channel estimate on a

per subcarrier basis (claim 29). Figures 9 and 10 disclose the estimates take place in

the time domain and the frequency domain (paragraphs 0083 and 0085).

Regarding claim 4, Mody discloses the aim of the channel estimation algorithm is to estimate the channel coefficients for all the sub-carriers (paragraph 0085).

Regarding claim 10, Mody discloses the multicarrier symbol comprises an OFDM symbol (abstract).

Regarding claims 11 and 13, Mody discloses an averaging circuit adapted to provide an averaged channel estimate by performing a time domain averaging and a frequency domain averaging on one or more received inputs (claim 29). The aim of the channel estimation algorithm is to estimate the channel coefficients for all the sub-carriers (paragraph 0085). The averaging of the coarse channel estimates in the frequency domain and the time domain takes place in the parameter estimator 112 of figure 8. Fine channel estimates are conducted in the time and frequency domains (paragraph 0089). The parameter estimator 112 provides an input signal to channel decoder 118 that detects and corrects errors in the data symbols (paragraph 0076). The channel decoder 118 outputs the data in its original form (paragraph 0076). The channel decoder is the adaptive equalizer and will provided feedback signals to the parameter estimator to adjust and correct its estimates according to the output of the channel decoder (paragraph 0076). The channel estimate is equal to the transfer function. The received signal is equivalent to the transmitted signal and the distortion caused by the medium the transmitted signal travels through prior to being received. The response H of a channel is equal to the received sequence divided by the known transmitted sequence in the frequency domain. The adjustments to the estimates will be conducted according to the equation of $H(f) = R(f)/T(f)$ to determine a transfer function (channel

estimate). The combination discloses a known sequence is used to determine the

channel response. The known sequence will be stored in the receiver. This is described

as a training sequence in paragraph 0076. The combination does not disclose the

generation of a replica of the transmitted symbol. Ebiko discloses a received sequence

is input to a channel estimation section 120 (figure 1). The channel estimation section

receives a replica of the received signal from the equalizer 130 (abstract). The replica of

the received signal is de-interleaved 140 and decoded 150 to recover the originally

transmitted symbol. This symbol is fed to the channel estimation section 120 to

determine the channel estimation. The channel estimation receives a received symbol

and the replica of the originally transmitted symbol. It would have been obvious for one

of ordinary skill in the art at the time of the invention to include an adaptive equalizer in

the apparatus. Instead of using a fixed replica symbol and being required to transmit a

known sequence to determine the channel estimate, data is used to calculate the

estimate. Therefore, the data rate of the system is increased allowing more data to be

transmitted in less time than before.

Regarding claim 12, Mody discloses the averaging circuit is adapted to provide

an averaged channel estimate by performing time domain averaging and frequency

domain averaging on one or more received channel estimates (claim 29).

Regarding claim 14, Mody discloses the multicarrier symbol comprises an OFDM

symbol (abstract).

Regarding claims 15, 16 and 18, Mody discloses a method of calculating

averaged channel estimate by performing a time domain averaging and a frequency

domain averaging on one or more received inputs (claim 29). The time domain channel

estimates are then converted to frequency domain channel estimates by performing an

FFT on the time domain channel estimates (paragraph 0089). The aim of the channel

estimate algorithm is to estimate the channel coefficients for all the sub-carriers

(paragraph 0085). The parameter estimator 112 provides an input signal to channel

decoder 118 that detects and corrects errors in the data symbols (paragraph 0076). The

channel decoder 118 outputs the data in its original form (paragraph 0076). The channel

decoder is the adaptive equalizer and will provided feedback signals to the parameter

estimator to adjust and correct its estimates according to the output of the channel

decoder (paragraph 0076). The channel estimate is equal to the transfer function. The

received signal is equivalent to the transmitted signal and the distortion caused by the

medium the transmitted signal travels through prior to being received. The response H

of a channel is equal to the received sequence divided by the known transmitted

sequence in the frequency domain. The adjustments to the estimates will be conducted

according to the equation of $H(f) = R(f)/T(f)$ to determine a transfer function (channel

estimate). The combination discloses a known sequence is used to determine the

channel response. The known sequence will be stored in the receiver. This is described

as a training sequence in paragraph 0076. The combination does not disclose the

generation of a replica of the transmitted symbol. Ebiko discloses a received sequence

is input to a channel estimation section 120 (figure 1). The channel estimation section

receives a replica of the received signal from the equalizer 130 (abstract). The replica of

the received signal is de-interleaved 140 and decoded 150 to recover the originally

transmitted symbol. This symbol is fed to the channel estimation section 120 to

determine the channel estimation. The channel estimation receives a received symbol

and the replica of the originally transmitted symbol. It would have been obvious for one

of ordinary skill in the art at the time of the invention to include an adaptive equalizer in

the apparatus. Instead of using a fixed replica symbol and being required to transmit a

known sequence to determine the channel estimate, data is used to calculate the

estimate. Therefore, the data rate of the system is increased allowing more data to be

transmitted in less time than before.

9.   Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mody et

al (US 2002/0181390) in view of Ebiko et al (WO 03/071712) further in view of

Papathanasion (US 2004/0142665).

Regarding claim 5, the combination of Mody and Ebiko discloses the apparatus

stated above in paragraph 9. The combination does not disclose the time domain

averaging is performed using a moving average. Papathanasion discloses averaging

using a moving average in paragraph 0042. Moving averaging is well known in the art

for its ability to maintain a constant average value. For this reason, it would have been

obvious for one of ordinary skill in the art at the time of the invention to combine the

teaching of Papathanasion into the apparatus of the combination of Mody and Ebiko.

10.   Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mody et al (US 2002/0181390) in view of Ebiko et al (WO 03/071712) further in view of Abeta et al (US 6,757,272).

Regarding claim 6, the combination of Mody and Ebiko discloses the apparatus stated above in paragraph 9. The combination does not disclose the time domain averaging is done by block averaging. Abeta discloses using block averaging (column 7, lines 57-67) since block averaging is computationally efficient since the average is not being constantly calculated. For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the block averaging of Abeta into the combination of Mody and Ebiko.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Burd whose telephone number is (571) 272-3008. The examiner can normally be reached on Monday - Friday 9 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on (571) 272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Kevin M. Burd/
Primary Examiner, Art Unit 2611
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